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ET DE LA STRATIGRAPHIE HOUILLÈRES

147

PUBLICATION N° 35

# A Namurian Marker-Horizon at Büsbach, near Aachen, Western Germany

BY

FRANK HODSON AND WILLIAM VAN LECKWIJCK



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1. — CH. ANCION, W. VAN LECKWYCK, F. DEMANET, A. PASTIELS et Y. WILLIÈRE, *Étude du Namurien et du Westphalien inférieur du Bassin de Huy recoupés par la galerie de Java* (Couthuin, Belgique), in-4° ... ... 1947

2. — CH. DELEERS et A. PASTIELS, *Étude biométrique des* Anthraconauta *du Houiller de la Belgique* (Première partie), in-4° ... ... 1947

3. — CH. ANCION, J. DAUTREBANDE, W. VAN LECKWYCK, A. PASTIELS et Y. WILLIÈRE, *Étude géologique du Bassin houiller de Liège. La concession de Marihaye*, in-4° ... ... 1948

4. — W. VAN LECKWYCK, M. SNEL, A. PASTIELS et Y. WILLIÈRE, *Étude du Gisement houiller de la Campine. Contribution à l'Etude stratigraphique et paléontologique du Westphalien B inférieur : La zone d'Asch*, in-4° ... ... 1949

5. — H. CHAUDOIR, M. SNEL, A. PASTIELS et Y. WILLIÈRE, *Étude du Gisement houiller de la Campine. Contribution à l'Étude stratigraphique et paléontologique du Westphalien B supérieur : La zone d'Eikenberg*, in-4° ... ... 1950

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*(Suite à la page 3 de la couverture.)*

ASSOCIATION POUR L'ÉTUDE DE LA PALÉONTOLOGIE
ET DE LA STRATIGRAPHIE HOUILLÈRES



PUBLICATION N° 36

# A Namurian Marker-Horizon at Bösbach near Aachen, Western Germany

BY

Frank HODSON and [illegible] Van LECKWIJCK

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ASSOCIATION POUR L'ÉTUDE DE LA PALÉONTOLOGIE
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PUBLICATION N° 35

# A Namurian Marker-Horizon at Büsbach, near Aachen, Western Germany

BY

FRANK HODSON AND WILLIAM VAN LECKWIJCK

| Publ. Ass. Étud. Paléont. | Bruxelles | 1958 | N° 35 | 13 p. | 2 pl. |
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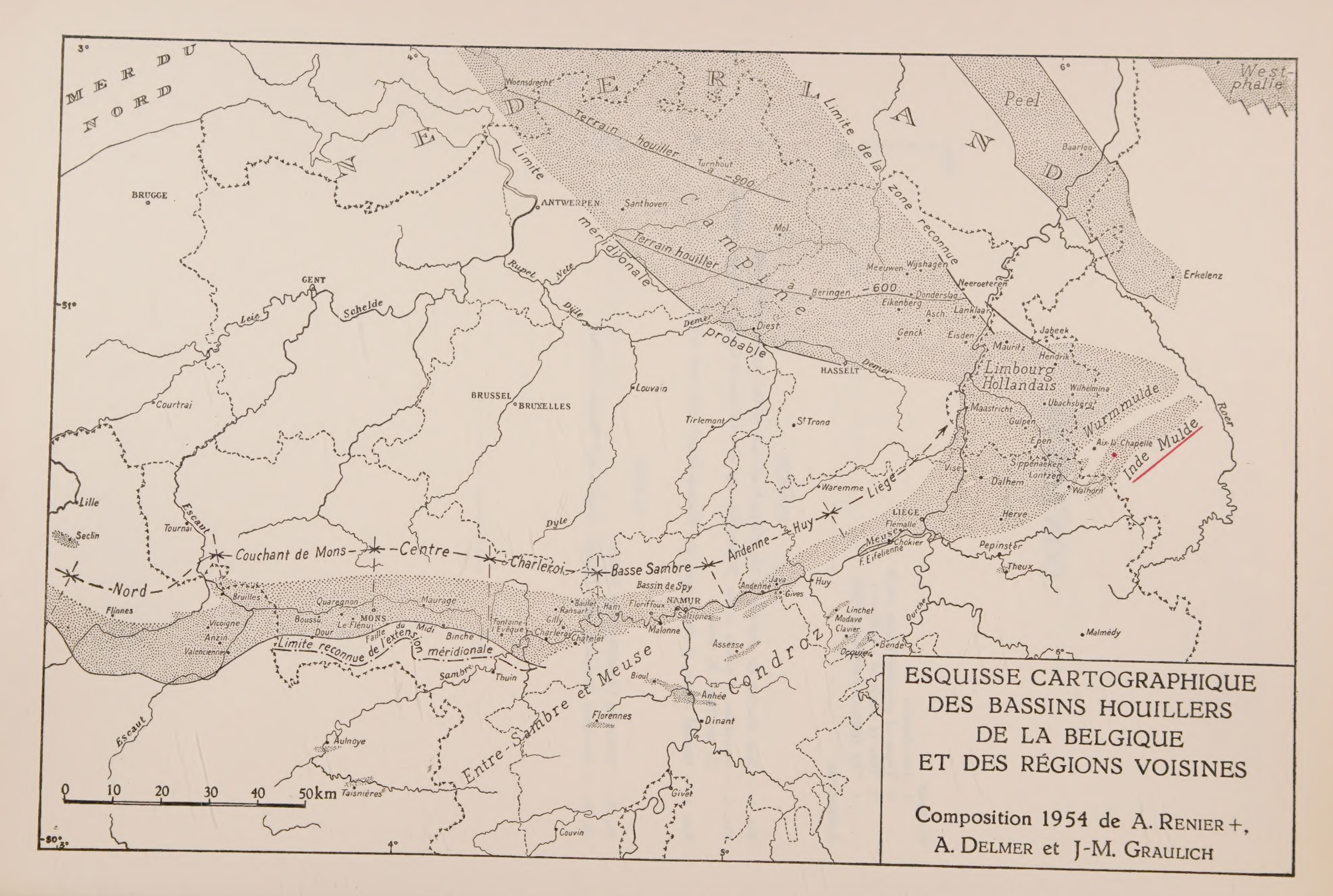



FIG. 1. — Position of the Büsbach roadside section, in the Inde Mulde.

# A NAMURIAN MARKER-HORIZON AT BÜSBACH, NEAR AACHEN, WESTERN GERMANY

## SUMMARY.

The recognition of the Namurian goniatite faunal band containing *Hudsonoceras proteum* (Brown) and *Homoceras smithi* (Brown) at Büsbach, near Aachen, Germany, near the top of the Wilhelmine Group of coal seams, enables these seams to be dated as belonging to the top of the Chokierian stage ($H_1$). A *Dimorphoceras* faunal phase occurs immediately below this faunal band over a wide area in England and Ireland and its significance is discussed. The occurence of a fragment of *Eumorphoceras* sp. in the faunal band is recorded. The time of origin of carbonate nodules known as « bullions » is discussed.

## 1. — INTRODUCTION.

Attention has recently been called to the possibility of a considerable lateral extension of certain thin beds in the Namurian which contain distinctive goniatite faunas (Hodson, 1957). Bisat and Hudson (1943, p. 429) indicated the usefulness of a particular thin bed containing *Hudsonoceras proteum* (Brown) and *Homoceras smithi* (Brown) as a reference plane and in particular as a datum for fixing the position of the variable *Reticuloceras* faunas which occur above it. It had been thought, however, that *Hudsonoceras proteum* had a limited geographical distribution being confined to the British Central Province of Carboniferous sedimentation (Moore, 1946, p. 437). Certainly some records of this species from the Continent prove, on re-investigation, to refer to forms of *Hudsonoceras* distinct from *Hudsonoceras proteum*. Thus the records of *Hudsonoceras proteum* by Ancion and Vandercammen (1951, pp. 273, 5, 6, pl. 1) and by Delmer (1955, pp. 157, 160, fig. 1, p. 166, pl. A, fig. 6) refer to *Hudsonoceras ornatum* (Foord and Crick) or allied undescribed species.

De Voogd (1929, pl. 5, fig. 31) figures a specimen referred to « *Homoceras* » cf. *proteum* from Bleyberg, Belgium. This specimen is a *Reticuloceras*, as also

are the specimens from Bleyberg (locality 127, p. 46) figured in figs. 38 and 39 (pl. 5) variously identified as « *Eumorphoceras* » *bilingue* (SALTER) by DELÉPINE and as « *Homoceras* » cf. *proteum* BROWN by H. SCHMIDT.

On the other hand, the material collected in 1922 by WUNSTORF, JONGMANS and VAN RUMMELEN and that collected in 1928 by DE VOOGD from Büsbach, Germany (both in DE VOOGD, 1929, p. 28, locality 40), contain true specimens of *Hudsonoceras proteum*. Amongst the poorly preserved specimens of the first collection DELÉPINE had indeed recognized « *Homoceras* » *proteum* BROWN, as indicated on page 28. Similarly, DE VOOGD had identified this species in his own material, which proved to be in a somewhat better state of preservation. But, after having taken the advice of H. SCHMIDT, he figured specimens from both collections under the names of « *Eumorphoceras* » *ornatum* FOORD and CRICK, (pl. IV, fig. 23) and *Homoceras* cf. *smithi* BROWN (figs. 22 and 34). On re-investigation, these specimens have now been referred to *Hudsonoceras proteum* BROWN, some of which occur in association with *Homoceras smithi* BROWN as shown on figure 34 (DE VOOGD, 1929).

The re-identifications of the material from Bleyberg and from Büsbach have been made possible by the loan to us of the figured specimens by Dr. R. J. H. PATIJN, Director of the Geologisch Bureau at Heerlen, to whom our thanks are due. From Büsbach, we have made extensive new collections.

Recently LEGGEWIE and SCHONEFELD (1957, pp. 233, pl. 17, fig. 1) have found the *Hudsonoceras proteum*/*Homoceras smithi* band near Wuppertal in the Ruhr, that is to say they have extended the geographical limits of the bed even further eastwards. DEMANET has recognised it also in the Berwinne Valley, near Visé, in association with *Homoceras* sp. (in LAMBRECHT, 1958).

## 2. — TYPES OF GONIATITE FAUNAL BANDS.

The goniatite faunal bands of the Namurian are often referred to as « marine bands » and this term is unassailable in the higher parts of the Namurian where well defined cyclothems are established and the bands in question contrast strongly with the other units in the cyclothem. It is evident, however, that in the Sabden Shales of England and their equivalents in Ireland the whole succession of strata in which these goniatite bands occur is marine and the so called « marine bands » are only marine shales of cephalopod faunal phase in marine shales of non-cephalopod phase. These latter often contain marine lamellibranchs such as *Posidoniella* and *Posidonia*. Moreover, it is known that there are two types of marine shales of cephalopod phase. One occurs in intensely black, carbonaceous shale containing goniatite faunas, the species of

which are used as zonal indices for the beds. These bands often contain carbonate nodules called « bullions » or even thin continuous bands of limestone. The other type contains goniatites of the genera *Anthracoceras* and/or *Dimorphoceras* to the exclusion of all other genera and the shales with this fauna usually contain some mica (Hudson and Cotton, 1943, p. 151; Moseley, 1954, pp. 429, 433). Such beds apparently :

1. accumulated more quickly and received a greater proportion of terrigenous materials than the first type;

2. accumulated on an oxygenated sea floor in contrast to the anaerobic sediments with pelagic shells;

3. were of shallower water type than the first or were deposited nearer the shoreline;

4. originated in sea water of reduced salinity due to the influx of fresh-water streams.

The *Dimorphoceras-Anthracoceras* layers are therefore somewhat intermediate between the « marine bands » and the « estuarine bands » which in part of the Namurian and especially the Westphalian contain fresh-water lamellibranchs. Moreover, in accordance with the general lessening of marine dominance in progressively higher Carboniferous beds, it is found that the higher Coal Measures marine bands which contain goniatites are of this particular phase. As Moseley has already said (1954, p. 249) these *Dimorphoceras-Anthracoceras* bands represent oscillations of the sea floor producing shallowing.

It is known that the *Hudsonoceras proteum-Homoceras smithi* band at Roughlee in Lancashire (Bisat and Hudson, 1943, p. 399) has a lower leaf of shale containing flattened *Dimorphoceras* and no other goniatites. In Eire, both in the Lisdoonvarna district of Co. Clare and in exposures some 20 m. S. of that place west of Ennis, the same bed occurs as at Roughlee. The overlap described by Hodson (1954) to the N of Lisdoonvarna is now given greater precision by the recent discovery that, at the extreme northern limit of the Clare shales outcrop on Slieve Elva, it is these sub-*proteum Dimorphoceras* beds which rest on the Carboniferous Limestone and that the two lower faunal beds containing members of the *Homoceras berychianum* group, which are found in the Roadford area of Co. Clare 4 m. to the south, have been overlapped.

The recognition of the widespread nature of this sub-*proteum Dimorphoceras* band together with its implication of shallowness is of particular interest in view of the new recognition of the dominantly terrestrial nature of the sub-*proteum* beds in Belgium and westernmost Germany where the hint of shallowing detected in Britain and Eire is greatly accentuated (fig. 2).

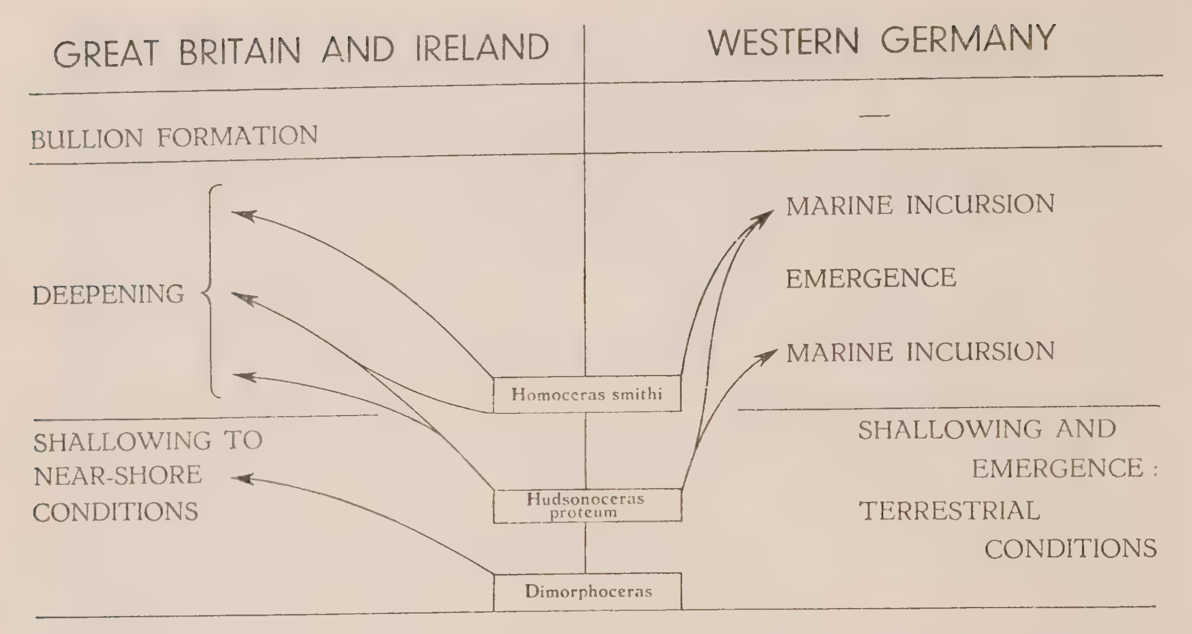



Fig. 2. — Succession of events in the British Isles and in westernmost Germany during uppermost $H_1$ and lowermost $H_2$ times.

## 3. — TIME OF ORIGIN OF « BULLIONS ».

Typically the *Hudsonoceras proteum/Homoceras smithi* bed occurs in a shale only a few cms thick. The shale has a basal layer crowded with *Hudsonoceras proteum* alone and an upper layer with *Homoceras smithi* only, but, between the two, is a band with the two species associated together. In England and Eire, bullions have been found in the bed. These carbonate nodules are thicker than the shale which is their lateral equivalent and which has been compressed around them. In contrast to those in the shale, fossils in the bullions are solid not compressed. In addition to the two species already mentioned, *Dimorphoceras moorei* Hodson has been described from them and a single fragment of *Eumorphoceras* is here recorded for the first time. The extreme rarity of *Eumorphoceras* is emphasised by the fact that only a single specimen has been collected amongst thousands of *Hudsonoceras proteum* and *Homoceras smithi* seen. Nevertheless, the occurrence is of great interest in that *Eumorphoceras* has been the presumed ancestor of *Hudsonoceras* although previously a gap existed between the last *Eumorphoceras* and the first *Hudsonoceras*.

Bearing upon the question as to the date of formation of the bullions is the observation that the vertical faunal succession observed in the shales is found also in the bullions — that is the upper and lower parts contain *Homoceras smithi* and *Hudsonoceras proteum* respectively with both in the middle.

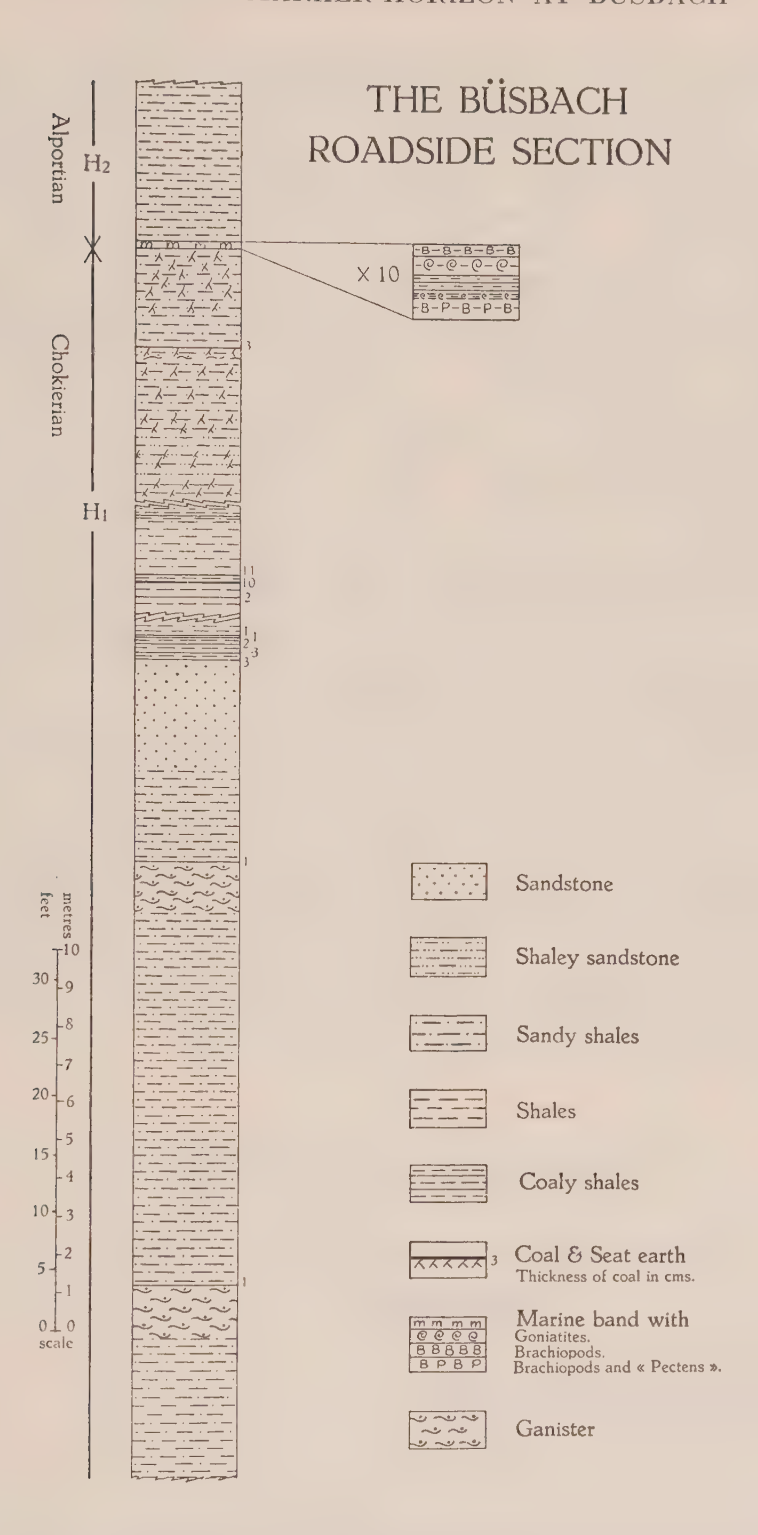



FIG. 3. — Vertical section of strata along the Büsbach - Brand road ; scale 1 : 200

The date of formation of the bullions has been recognized as not much later than the sedimentation of the beds which contain them, since, although the shales contain only flattened goniatites, those of the bullions have been protected from the pressure of superincumbent beds and remain solid and perfectly undistorted. The recognition however that the complete change in fauna shown in the upward succession of a few cms. of shale is also to be found in the bullions themselves shows that the latter could not have been formed contemporaneously with the formation of the earliest goniatite bed. Sufficient time must have elapsed between the formation of the two goniatite layers to have permitted the area to become « colonized » by an entirely new fauna before the relics of both faunas were enclosed in the bullions and it is probable that this interval as measured in years might have been a fairly lengthy one. This is borne out also by the Büsbach roadside section in which a lower layer with *Hudsonoceras proteum* alone is separated from the beds with both *Hudsonoceras proteum* and *Homoceras smithi* by 5 cms. of coaly shale (figs. 2 and 3).

The conclusion to be drawn from this investigation is that study of minute stratigraphical detail leads to the recognition of the extremely widespread nature of the paleogeographic events to which they testify.

The Alportian Stage ($H_2$) of which the *Hudsonoceras proteum* band forms the base contains also faunal bands with *Homoceras undulatum* (Brown) and, succeeding this, a bed with *Homoceratoides prereticulatus* Bisat. Above these occurs the *Homoceras magistrorum* Hodson band (Hodson, 1957) marking the base of the $R_1$ beds. The relative close proximity of these bands encourages the hope that the discovery of any one of them should lead to the search for others. Moreover, the recognition of even one of these gives a very good guide to geological horizon and to the proximity of coal beds which in Western Germany, Belgium and France lie a short distance below them.

## 4. — THE BÜSBACH ROADSIDE SECTION.

**Section of beds on the roadside at Büsbach, near Aachen (fig. 3).**

| DESCRIPTION. | Thickness in centimetres. |
|---|---|
| Sandy shales ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... | 420 |
| Shale with Productids and *Orbiculoidea* (1) ... ... ... ... ... ... ... ... | 3 |
| Shale with *Hd. proteum* and *H. smithi* ... ... ... ... ... ... ... ... ... | 5 |
| Coaly shale ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... | 5 |
| Shale with *Hd. proteum* . ... ... ... ... ... ... ... ... ... ... ... ... ... | 1 |

(1) This brachiopod association in the *proteum* faunal band is also known at Congleton Edge, Staffordshire.

| DESCRIPTION. | Thickness in centimetres. |
|---|---|
| Shale with Productids and « Pectens » | 6 |
| Sandy shales with roots | 163 |
| Sandy shales | 100 |
| COAL | 3 |
| Sandy shales with roots | 11 |
| Ganister | 11 |
| Sandy shales, some with roots | 210 |
| Shaley sandstone with roots | 95 |
| Shales with roots | 70 |
| GAP. | |
| Sandy shales. | |
| Coaly shale | 3 |
| Sandy shales | 154 |
| COAL | 11 |
| Shale | 3 |
| COAL | 10 |
| Shale | 35 |
| COAL | 2 |
| Shale | 45 |
| FAULT, conceals some beds. | |
| Shale | 40 |
| COAL | 1 |
| Shale | 2 |
| COAL | 1 |
| Shale | 14 |
| COAL | 2 |
| Shale | 27 |
| COAL | 3 |
| Shale | 14 |
| COAL | 3 |
| Sandstone | 300 |
| Sandy shales | 244 |
| COAL | 1 |
| Ganister | 120 |
| Sandy shales | 1.000 |
| COAL | 1 |
| Ganister (seen just above the 4 km borne kilometrique) | 140 |
| Sandy shales | 306 |
| Total | 3.585 |

The immediate upward continuation of this section is concealed under vegetation although sporadic exposures of higher beds are seen further along the roadside.

Hahne (1930, pp. 27, 31), presumably on the basis of the erroneous identification of *Hudsonoceras proteum* as *Hudsonoceras ornatum*, was led to assign the Wilhelmine seams of the Aachen area to a lower *Reticuloceras* ($R_1$) age (1). As such, this coal-forming episode tended to be isolated. Now that their Chokierian ($H_1$) age is recognised, they fall into line with such other groups as the Marsinne seams of Belgium and their French equivalents. It is proposed later to discuss the palaeogeography of *Homoceras* times when a complete synthesis of all Western European environments of that age will be attempted. For the moment it need only be mentioned that the record from the Ruhr (Leggewie and Schonefeld, 1957) and the English and Irish occurrences in completely marine series show that the coal forming area was limited both to the East and West.

(1) At the same time, Hahne points out that the « *Homoceras*-Form recht grosse Aehnlichkeit mit *H. proteum* hat (so war sie auch ursprünglich von De Voogd bestimmt) ». He then adds : « Wenn es diese Form doch sein sollte, würde dieser Horizont unter der *inconstans*-Zone liegen (in der H-Stufe Bisat's). Das würde besser mit der tiefen Lage der Schicht im Profil übereinstimmen. Die Frage ist noch in der Schwebe. » It has now been proved that Hahne's alternative supposition is the right one. In a recent paper, however, the possibility of the Büsbach Goniatites being *Hudsonoceras proteum* is no longer mentioned (Herbst, 1955, p. 293, locality 4).

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# PLATE A

## EXPLANATION OF PLATE A.

Fig. 1. — *Hudsonoceras proteum* (Brown). Roadford, County Clare, Eire. Geological Survey Museum, London, No. 85387. × 8·3.

Figs. 2-4. — *Homoceras smithi* (Brown). Roadford, County Clare, Eire. Fig. 2 lateral view, fig. 3 ventral view, fig. 4 oblique view, all of the same specimen. F. Hodson collection. × 5·0.



FRANK HODSON — Nautiloidea [illegible]

## EXPLANATION OF PLATE A.

[illegible] [illegible] (Brown). Roadford, County Clare, Eire. Geological [illegible], London. No. [illegible]87. × 8·3.

[illegible] [illegible] (Brown). Roadford, County Clare, Eire. Fig. 2 lateral [illegible] view, fig. 4 oblique view, all of the same specimen. [illegible]




FRANK HODSON. — Namurian Goniatites from Ireland.

Phototypie A. Dohmen. Bruxelles



PLATE B

## EXPLANATION OF PLATE B.

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FIG. 1. — *Hudsonoceras proteum* (BROWN). Büsbach roadside section, near Aachen, Western Germany. Geologisch Bureau, Heerlen, No. 24331. DE VOOGD collection. × 5·0.

FIG. 2. — *Hudsonoceras proteum* (BROWN). Roadford, County Clare, Eire. Compare this with fig. 4. × 5·0.

FIG. 3. — *Hudsonoceras proteum* (BROWN). Roadford, County Clare, Eire. Ventral view. Orad towards the base. Geological Survey Museum, London, No. 87032, F. HODSON collection. × 5·0.

FIG. 4. — *Hudsonoceras ornatum* (FOORD and CRICK). Mam Tor, Derbyshire, England. Geological Survey Museum, London, No. 55460. SWINNERTON collection. Compare this with fig. 2. Note especially the smaller umbilicus of *Hd. ornatum* compared with *Hd. proteum* and the more regular spacing of the spirals in the former. × 5·0.

FIG. 5. — *Hudsonoceras proteum* (BROWN). Young specimen showing appearance of spirals on the venter. F. HODSON collection. Magnified.

FIG. 6. — *Homoceras smithi* (BROWN). Büsbach roadside section, near Aachen, Western Germany. Geologisch Bureau, Heerlen, No. 24514. [Specimen figured by DE VOOGD, 1928, pl. 4, fig. 34.] × 5·0.

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FRANK HODSON. — Namurian Goniatites from England, Ireland and Western Germany.

## EXPLANATION OF PLATE B.

[illegible] *…ceras proteum* (Brown). Büsbach roadside section, near Aachen, [illegible] Germany. Geologisch Bureau, Heerlen, No. 24331. De Voogd [illegible] 5·0.

[illegible] *proteum* (Brown). Roadford, County Clare, Eire. Compare [illegible] with fig. 4. × 5·0.

[illegible] *proteum* (Brown). Roadford, County Clare, Eire. Ventral [illegible] the base. Geological Survey Museum, London, No. 87032, [illegible] × 5·0.

[illegible] *ornatum* (Foord and Crick). Mam Tor, Derbyshire, England. [illegible] Survey Museum, London, No. 55460. Swinnerton collection. [illegible] with fig. 2. Note especially the smaller umbilicus of *Hd. ornatum* [illegible] *Hd. proteum* and the more regular spacing of the spirals in [illegible]

[illegible] *proteum* (Brown). Young specimen showing appearance of [illegible] F. Hodson collection. Magnified.

[illegible] (Brown). Büsbach roadside section, near Aachen, Western [illegible] Bureau, Heerlen, No. 24514. [Specimen figured by [illegible] 4, fig. 34.] × 5·0.




FRANK HODSON. — Namurian Goniatites from England, Ireland and Western Germany.

Phototypie A. Dohmen, Bruxelles

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